Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:

TECHNOLOGICAL ADVISORY COUNCIL TECHNICAL INQUIRY INTO REFORMING TECHNICAL REGULATIONS	))))	ET Docket No. 17-215

To: The Office of Engineering and Technology – Technological Advisory Council.

COMMENTS OF DECAWAVE

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October 30, 2017

Decawave welcomes the opportunity to give input to the Technological Advisory Council's technical inquiry into reforming technical regulations[1].

Decawave is a developer and supplier of Impulse-Radio Ultra-Wideband (IR-UWB) semiconductor devices designed to operate under FCC PART 15 Subpart C Section 15.250 (the so-called wideband rules) and/or under Subpart F (the ultra-wideband rules). One of the key application areas of the current deployments is real-time location systems.

UWB regulations have never been reviewed since the original Report and Order. As noted by the Commission at the time[2], these rules were very cautious and extremely conservative. One indicator of the fact that the rules are unduly restrictive is the large number of waiver requests and the fact that most of these have been granted. Whilst waivers are one way to progress without changing the actual regulations, the necessity of waivers favours larger and more established organisations and poses an extra barrier to smaller start-ups trying to realise novel applications.

Ultra-wideband applications have now been on the market for a considerable time. To date, Decawave alone has shipped over 4 million transceivers, while some of our competitors have been in the market for much longer. Despite this widespread adoption of UWB technology, there hasn't been a single report of harmful interference.

Based on these observations and the feedback of our customers, Decawave believes a review of the ultra-wideband rules is due and will benefit US consumers and the industry. In particular, Decawave would like to propose that the following regulations are reviewed:

The restriction of the 'wideband rules' to the band 5925 – 7250 MHz

There is a significant overlap between the wideband rules of § 15.250 and the ultra-wideband regulations of Subpart F. In 2005, when introducing the wideband rules, the FCC argued that Fixed Satellite receivers were not vulnerable to the changes introduced in Part 15.250. This also applies to the satellite receivers in the bands from 7250 MHz to 8500 MHz

- Rather than write their own regulation, many countries in the world adopt either the FCC UWB rules or the European UWB rules.
- Japan and Korea only allow UWB in the 7.25 to 10 GHz range
- There are many restrictions in the ultra-wideband rules that are not present in the wideband rules (e.g. 10 second rule, different minimum bandwidth.)
- Manufacturers would reduce costs and more easily address target markets if they do not have to comply with different rules in different jurisdictions.
- The European rules and the rules in China do not have these extra UWB restrictions and cover the band from 6 GHz to 8.5 GHz

In order to simplify the regulations, to promote worldwide harmonisation of the UWB regulations and to enable a global UWB band going from 7.25 GHz to 8.4 GHz, we propose that the wideband rules are expanded to cover the frequency range of 5.925 GHz to 8.4 GHz.

[1] ET Docket No. 17-215
[2] FCC 02-48, 17 FCC Rcd. 7435 (2002)

The prohibition of fixed outdoor UWB applications

The current wideband regulations state:

> § 15.250 Operation of wideband systems within the band 5925-7250 MHz.
>
> …
>
> (c) Operation on board an aircraft or a satellite is prohibited. Devices operating under this section may not be employed for the operation of toys. Except for operation onboard a ship or a terrestrial transportation vehicle, the use of a fixed outdoor infrastructure is prohibited. A fixed infrastructure includes antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole.

The ultra-wideband regulations have similar prohibitions in §15.517(3) and §15.519(2):

> § 15.519 Technical requirements for hand held UWB systems.
>
> …
>
> (2) The use of antennas mounted on outdoor structures, e.g., antennas mounted on the outside of a building or on a telephone pole, or any fixed outdoors infrastructure is prohibited. Antennas may be mounted only on the hand held UWB device.
>
> (3) UWB devices operating under the provisions of this section may operate indoors or outdoors.

The Second Report and Order[3] motivates these restrictions based on a desire to prevent wide-area communication systems from using ultra-wideband. However, as noted in the same Second Report and Order, the low permitted transmit power levels are insufficient to operate ultra-wideband based wide-area communication systems.

The main use of ultra-wideband is high precision real-time localisation systems (RTLS), where it is the only technology providing such functionality. The current prohibition on fixed outdoor transmitters unnecessarily prevents outdoor RTLS applications.

When challenged by a waiver request[4], this prohibition was lifted for that application. However, many smaller companies with novel ideas do not have the means to wait for a waiver.

Based on these considerations, we believe there is no technical justification for the prohibition on fixed outdoor services and we request that these restrictions are reviewed.

The 10 second rule for hand held UWB systems

The current regulations state:

> § 15.519 Technical requirements for hand held UWB systems.

[3] UWB Second R&O, 19 FCC Rcd at 24571, paragraph 27

[4] Request by iRobot Corporation for Waiver of Section 15.250(c) of the Commission's Rules, ET Docket 15-30 (filed Jan. 22, 2015)

…

(1) A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

Decawave believes there is no technical justification for the requirement to receive an acknowledgement within 10 seconds. Indeed, wideband systems operating under § 15.250 use overlapping spectrum under similar conditions without the requirement for an acknowledgement.

The requirement to receive an acknowledgement from the associated receiver, if interpreted narrowly, would prevent the implementation of transmit only time-difference-of-arrival (TDOA) based localisation systems. TDOA systems locate the transmitting "tag" by comparing the arrival time of the transmitted signal at a number of "anchors" in known positions. Such TDOA systems are very attractive because the battery powered tags are only required to transmit, with a very low duty cycle. Such tags need not be required to incorporate receiver and can be made very power efficient. Since only a single transmission is required to locate the tag, the TDOA systems are also very spectrally efficient. We note that the Commission accepted PLUS Location Systems argument that their TDOA tag ceases transmitting after every packet and that the packet duration is much less than 10 seconds[5]. These systems comply with the letter of the regulations because the tags cease transmitting. The tags do, however, transmit again, after a short period of time, without receiving an acknowledgement. The regulation does not specify for how long the transmission should cease, so this regulation is practically meaningless and should be removed.

[5] See https://fccid.io/ZEH0414/Letter/Response-Letter-8-13-2014-2369952, question 4